Hot Projects

Center for Plant Health Science & Technology
AQI & Port Technology

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Development of trace element analysis for identifying origin of agricultural imports: The combined effects of plant genetics and elemental soil composition interact to produce unique chemical signatures in plants specific to geographical areas in which they were grown. A chemical analysis system based on these parameters has been developed to determine the place of origin of agricultural imports. Use of this system, called trace element analysis, will aid in deterring smuggling of agricultural products into the U.S. Accomplishments at this point include the completion of the authentic library on potatoes and the initiation of the development of authentic libraries for mangos, avocados, and parvals.

Development of electronic 'sniffer' nose for detection of actionable contraband in passenger baggage and mail: Passenger baggage and mail represent major pathways for introduction of contraband. A portable electronic nose prototype is being developed by CPHST to rapidly alert the front line officer to the presence of any contraband on incoming passenger bag and mail lines. The instrument has capability to detect the presence of a variety of contraband ranging from bioterror agents to fruits, vegetables, and meats.

Development of Computational Fluid Dynamics Model of Cold Treatment Chamber: Recent failures of the sustained cold treatment protocol have sparked an interest in validation of the treatment. A computational fluid dynamics model of a cold treatment chamber was produced in order to simulate the effects of operational factors on the cooling rate in a cold treatment. Results of the simulations show that hot spots can exist in fruit pallets undergoing cold treatment, cooling rate is dependent upon air flow and upon pallet stacking configuration, and pre-cooling to or near the target treatment temperature is necessary to prevent formation of hot spots. Based on these results, the cold treatment chapter of the PPQ Treatment Manual has been rewritten to incorporate the new information regarding the number and placement of temperature monitoring sensors and guidelines on pre-cooling and airflow.

Development of alternative quarantine treatments to methyl bromide fumigation: A major quarantine treatment utilized by PPQ is methyl bromide, a fumigant being phased out of production under provisions of the Montreal Protocol. Although quarantine uses are presently exempt, it is incumbent upon the agency to develop alternatives to this treatment. CPHST is testing a number of chemical replacements as well as different technologies that can be used to replace methyl bromide. These include fumigants such as sulfuryl fluoride, phosphine, and cyanogen and non-chemical technologies such as radio frequency radiation and ionizing radiation. Preliminary results indicate a slightly greater efficacy of sulfuryl fluoride over methyl bromide in reducing populations of *Irpex lacteus*, *Serpula lacrymans*, *Postia placenta*, *Armillaria mellea*, and *Gloeophyllum trabeum*. These findings could have tremendous implications for treating solid wood packing material which is a major pathway for the introduction of exotic pest species.

Development of mitigating technologies in support of domestic emergency programs: CPHST is actively involved in development of pesticide treatments and application technologies used for control of the Asian Longhorned Beetle, Emerald Ash Borers, and the red imported fire ant infestations in the U.S. These range from development of new chemical and non-chemical pesticides to methods for application. Among the notable results at this point is the finding that dinotefuran generally seems to be more efficacious than imidacloprid and clothianidin against Emerald Ash Borers, and nearly as good as imidacloprid against the Asian Longhorned Beetle.

Treatment Manual Index: The Treatment Manual Index serves as an electronic, online, searchable database which front ends the PPQ Treatment Manual. Unless one is extremely familiar with the layout of PPQ's treatment manuals, it can take a considerable amount of time to locate a specific treatment and there is a significant risk of overlooking a pertinent treatment option. This web-based index enables the user to query for specific treatments, treatment categories, pests, commodities, or keywords. It allows downloading of PDF files of both the treatment schedule and its corresponding CFR. The index improves accuracy, reduces effort, and reduces time in locating appropriate schedules. This product is available at https://manuals.cphst.org/TIndex/treatmentSearch.cfm.

Chemical Probe for Methyl Bromide: Scientists at the Analytical and Natural Products Laboratory in Gulfport, MS have developed a method to determine if commodities have been fumigated with methyl bromide. The method has been successfully tested on oranges, grapefruit, Valor beans, and pineapple. Produced into a test kit, it provides a simple and rapid diagnostic tool for use by officers in the field who need to verify that commodities have been fumigated.

Container and Vessel Cold Treatment Certification Database: There are 200 vessels and 720,000 containers currently certified by USDA to conduct in-transit cold treatment on fresh fruit imports. Vessel and container certification rates have been growing substantially in past years necessitating timely access to certification status. In response, the online Container and Vessel Certification Database was developed. It provides industry and regulatory agencies real time data on vessels and containers certified by USDA. This searchable website also houses information that was not readily available before, like vessel sensor diagrams and record model numbers – key information required by inspecting officers during the ship recertification process. This product is available at http://www.cphst.org/treatment/.

Electronic Version of the PPQ 429 Fumigant Record: CPHST is required to maintain records of PPQ-monitored fumigations and other treatments performed on agricultural imports and exports. The 429 electronic form standardizes data input, improves accuracy, improves compliance with EPA's Section 18 exemption for methyl bromide, and eliminates time required to complete traditional paper reports. Through a continuous dialogue with the ports, a second version was developed that includes improved statistical reporting to serve more localized needs, as well as features various safeguarding components. This version is currently being beta tested at five high volume ports with full-scale rollout scheduled for May 2005. This password-protected website is available at https://secure.peral.org/treatments/.

Q56 Fresh Fruits and Vegetables Reference Database: CPHST has launched the Q56 Fruit and Vegetable Guide, which provides key regulatory information extracted from the PPQ Plant Import Manual: Nonpropagative in a more useful format. This website permits the user to perform product and country summaries to determine which commodities are permitted entry into the United States. It is anticipated that it will become a valuable tool for CBP, PPQ, IS, foreign cooperators, and industry to utilize and replace the current paper and online version. It also contains supplemental information, like uploaded images, lists of translated and common commodity names, and growing seasons. These added features will improve the identification process and facilitate multinational communication. This product is available at https://manuals.cphst.org/q56/Q56Main.cfm.

Treatment Schedules and Operational Guidelines for the Phosphine Gas Fumigants ECO2FUME and VAPORPH3OS: ECO2FUME and VAPORPH3OS are gas fumigants that have been approved by the Treatment Quality Assurance Unit for tobacco export fumigations. Operational guidelines and corresponding treatment schedules are needed for the gas fumigants. A new chapter was written for the PPQ Treatment Manual to provide PPQ personnel with the required information to conduct fumigations using ECO2FUME and VAPORPH3OS.

Treatment Schedules and Operational Guidelines for the J System Fumigation with Phosphine used in Ship Holds During In-Transit Fumigation of Wood Chips: The Treatment Quality Assurance Unit has approved the use of a low-flow recirculation system for the fumigation of wood chips within ship holds. Many countries are mandating the use of the J System to guarantee recirculation of the fumigant within the ship hold. A new chapter was written for the PPQ Treatment Manual to provide PPQ personnel with operational guidelines and references to the appropriate treatment schedules for the recirculation system.

Treatment Schedules and Operational Guidelines for the Horn Diluphos System: The Treatment Quality Assurance Unit has approved the Horn Diluphos System (HDS) for phosphine fumigations. The HDS is an automated system that dilutes pure phosphine gas with air to create an air-phosphine mixture below the ignition limit for phosphine. A new chapter was written for the PPQ Treatment Manual to provide PPQ personnel with operational guidelines and references to the appropriate treatment schedules for commodities treated using this automated system.